Concise Review: Making Stem Cells Retinal: Methods for Deriving Retinal Pigment Epithelium and Implications for Patients With Ocular Disease.

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Authors: Lyndsay L Leach, Dennis O Clegg

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Public Summary:
Stem cells provide a potentially unlimited source of cells for treating a plethora of human diseases. Regenerative therapies for retinal degenerative diseases are at the forefront of translation to the clinic, with stem cell-derived retinal pigment epithelium (RPE)-based treatments for age-related macular degeneration (AMD) already showing promise in human patients. Despite our expanding knowledge of stem cell biology, methods for deriving cells, including RPE have remained inefficient. Thus, there has been a push in recent years to develop more directed approaches to deriving cells for therapy. In this concise review, we summarize recent efforts that have been successful in improving RPE derivation efficiency by directing differentiation from human pluripotent stem cells using developmental cues important for normal RPE specification and maturation in vivo. In addition, potential obstacles for clinical translation are discussed. Finally, we review how derivation of RPE from human induced pluripotent stem cells (hiPSCs) provides in vitro models for studying mechanisms of retinal disease and discovering new avenues for treatment.

Scientific Abstract:
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